POLICY UPDATE

MARCH 2014

CHINA PHASE 4 PASSENGER CAR FUEL CONSUMPTION STANDARD PROPOSAL

ICCT **POLICY UPDATES** SUMMARIZE REGULATORY AND OTHER DEVELOPMENTS RELATED TO CLEAN TRANSPORTATION WORLDWIDE.

On January 21, 2014, the Chinese Ministry of Industry and Information Technology (MIIT) released a proposed fuel consumption standard for passenger cars. The so-called Phase 4 standard, which would regulate domestically manufactured and imported new passenger cars sold in China from 2016 to 2020, echoes China's *Energy-Saving and New Energy Vehicle Industry Development Strategic Plan of 2012–2020*. It projects an overall fleet-average fuel consumption of 5L/100km for new passenger cars in 2020, as measured over the New European Driving Cycle (NEDC), if all manufacturers meet the weight-based corporate-average targets defined in the regulation. Based on ICCT's internal estimates, the proposed standard would reduce oil consumption by approximately 348 million barrels and reduce tank-to-wheel carbon dioxide emissions by about 149 million metric tons in 2030[1].

This policy update summarizes the major aspects and provisions of the proposed regulation and compares it to the global context.

STRINGENCY

Under the proposed rule, average fuel consumption of new passenger cars would fall to 5 L/100km in 2020, as measured over the NEDC, from an expected fleet average of 6.9L/100km in 2015. This is an overall reduction of about 28%, or 6.2% annually, between 2015 and 2020[2]. The regulation is expected to contain a variety of compliance flexibilities and credits that will likely reduce the overall stringency of the program, as explained in the next section.

The proposed Phase 4 regulation includes both vehicle-maximum fuel consumption limits and a corporate-average fuel consumption (CAFC) standard for each manufacturer based on vehicle curb weight distribution across the manufacturer's fleet. Manufacturers and importers must meet both standards; that is, for each model year, each vehicle produced must meet its own weight-based maximum fuel consumption limit, and each manufacturer's passenger car fleet must meet its corporate-average fuel consumption target.

The numerical targets for the vehicle maximums are identical to the current Phase 3 standard. The first two columns in Table 1 show the maximum fuel consumption limits for regular

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1 The fuel saving and CO_2 reduction estimates are made using ICCT's global transportation roadmap model. For more information on the model see http://www.theicct.org/global-transportation-roadmap-model.

2 According to official compliance data, actual fleet fuel consumption rate in 2012 is about 7.3 L/100km, therefore the actual ambition of annual progress between the current baseline (2012) and 2020 is about 4.6%.

cars and certain special-feature cars (those with non-manual transmissions or with three or more rows of seats). The Phase 4 CAFC proposal is based on the same 16 vehicle curb-weight classes defined in the Phase 3 standard. The numerical target for each bin is lowered between 25% and 37% from Phase 3, with greater reductions for the heavier weight bins.

The CAFC standard also sets separate targets for regular vehicles and two types of special-feature vehicles, which in this case are defined as: vehicles of curb mass less than or equal to 1,090 kilograms with three or more rows of seats; all other vehicles with three or more rows of seats. The first specialty car type mainly refers to a type of mini-sized cargo van unique to China that is usually built on a mini-car platform. The market for these vehicles is mainly lower-income individual consumers or small-business owners in suburban or rural areas. The second refers to small vans, large SUVs and multi-purpose cross-style vehicles generally. Fuel consumption targets for each curb mass bin for the two special-feature vehicle types are 5% and 3% higher, respectively, than those for regular cars. The last three columns of Table 1 show the Phase 4 CAFC standard targets for all three types of vehicles.

Table 1. Numerical targets of proposed Phase 4 regulation

Curb Mass Bin	Maximum Limit (L/100km)		CAFC Target (L/100km)		
kg	Reg. Cars	Spec. Cars	Reg. Cars	Minivans	Cars ≥3 Rows
0<CM≤750	5.2	5.6	3.9	4.1	Same as Minivans
750<CM≤865	5.5	5.9	4.1	4.3	
865<CM≤980	5.8	6.2	4.3	4.5	
980<CM≤1090	6.1	6.5	4.5	4.7	
1090<CM≤1205	6.5	6.8	4.7	Same as Reg.	4.8
1205<CM≤1320	6.9	7.2	4.9		5
1320<CM≤1430	7.3	7.6	5.1		5.3
1430<CM≤1540	7.7	8	5.3		5.5
1540<CM≤1660	8.1	8.4	5.5		5.7
1660<CM≤1770	8.5	8.8	5.7		5.9
1770<CM≤1880	8.9	9.2	5.9		6.1
1880<CM≤2000	9.3	9.6	6.2		6.4
2000<CM≤2110	9.7	10.1	6.4		6.6
2110<CM≤2280	10.1	10.6	6.6		6.8
2280<CM≤2510	10.8	11.2	7		7.2
2510<CM	11.5	11.9	7.3		7.5

SCENARIOS

Actual fleet-average fuel consumption performance in 2020 will depend on China's sales mix of vehicles, and average vehicle weight, in that year. To provide a preliminary evaluation, the ICCT extrapolated from 2010 new passenger car market data to estimate fleet average fuel consumption for 2020. Regular cars, as defined for the Phase 4 CAFC standard, were the mainstream vehicles, representing over 80% of annual passenger car sales in 2010. Minivans and other cars with three or more rows of seats represented 13% and 6% of the annual sales, respectively. Fleet average vehicle weight was about 1,290 kg in 2010. Assuming the market structure and average vehicle weight remains the same until 2020, the new passenger car fleet fuel consumption would decline to 5L/100km under the proposed regulation.

However, the average curb weight of Chinese passenger car fleet has risen steadily, from 1,253 kg in 2010 to 1,317 kg in 2013. Recognizing this trend, MIIT stepped up the reference fleet weight bin (i.e., the bin in which the fleet-average curb weight is expected to fall) for developing the 2020 standard curve from 1,205~1,320 kg to 1,320~1,430 kg. Assuming the actual fleet-average curb weight is around the midpoint of the new reference bin, at 1,375 kg (representing an average 6% increase from the 2010 level), and the relevant market shares of regular cars, minivans and other vehicles with no less than three rows of seats remain at the 2010 levels, the new passenger car fleet fuel consumption would then fall to 5.1L/100km.

The above scenarios do not reflect the flexibilities in the regulation, which are discussed below.

PROGRESS FROM PREVIOUS REGULATIONS

The proposed Phase 4 standard remains similar in structure to China's three previous standards. The fleet is divided into 16 curb weight bins, and each bin is assigned a fuel consumption target. Bin steps are distributed quite evenly across the majority of vehicle weights, with relatively wider spreads for the heavier vehicle weight bins. The target for each bin has tightened over time, as illustrated in Figure 1. Note that the first two phases of fuel consumption standards were per-vehicle maximum fuel consumption limits, while starting with Phase 3 China began to adopt corporate-average standards. Therefore, when evaluating progress in the stringency of these standards, it is fair to compare the proposed Phase 4 CAFC standard to the Phase 3 CAFC standard.

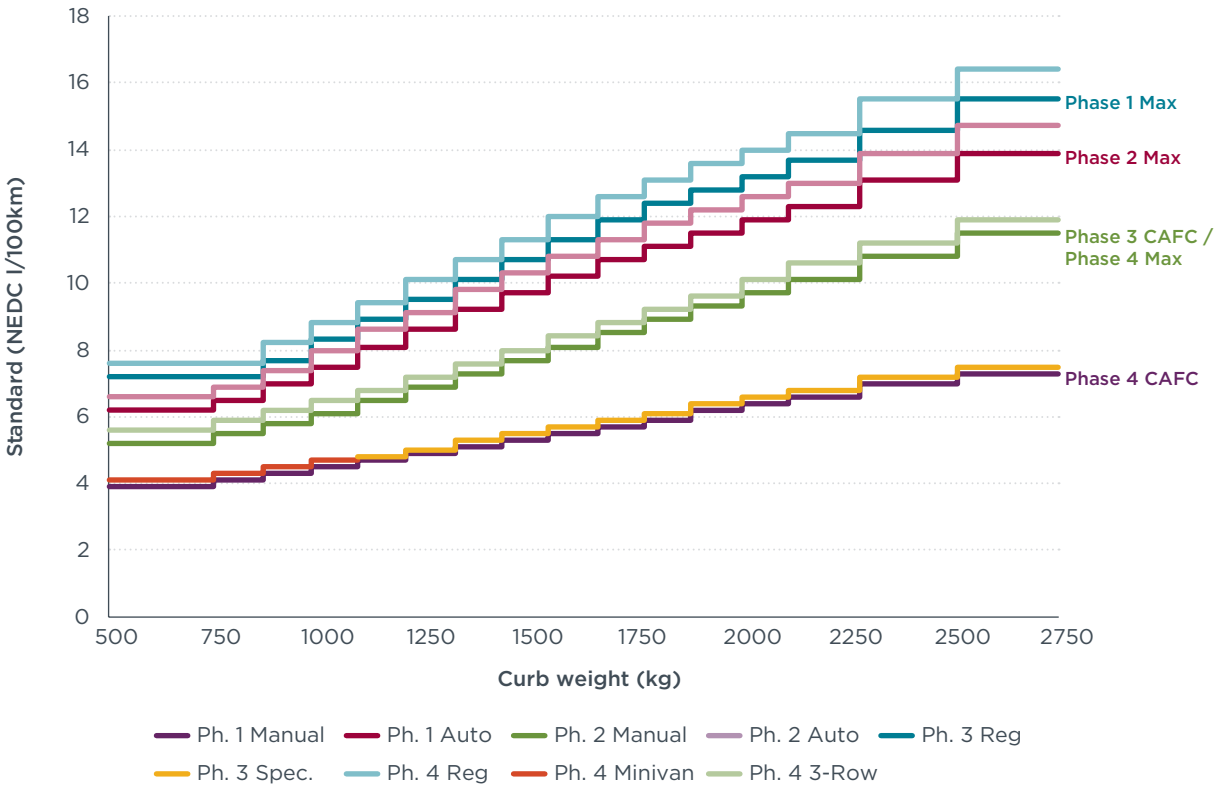
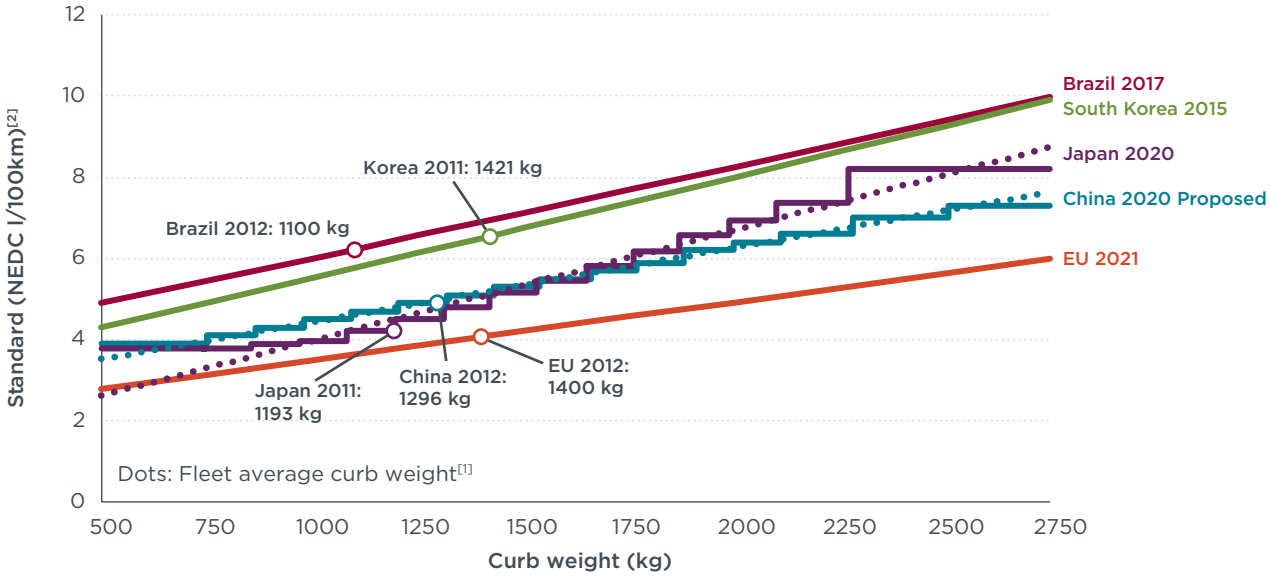


Figure 1. Illustration of past, current, and proposed fuel consumption standards for new passenger cars in China

The proposed Phase 4 standard has several improvements over the Phase 3 standard. First, the overall slope of a linear curve through the midpoint of each step is flatter for the Phase 4 standard than for Phase 3. This means that the Phase 4 standard is tougher for heavier vehicles relative to the Phase 3 standard, which reduces the incentive to increase vehicle weight. Figure 2 compares the slope (or derived slope) of weight-based passenger vehicle CO_2 or efficiency standard curves adopted or proposed in the European Union, Japan, China, South Korea, and Brazil. The curve derived from the China Phase 4 proposal for regular cars (blue dotted line) is the second flattest standard curve among the five. Second, although the Phase 4 standard still treats regular and special vehicles differently, the gaps in fuel consumption requirements for the various car types are smaller.



[1] The definition of curb weight is commonly vehicle empty weight with standard equipemnt, except that EU requires to plus 75kg occupant and luggage weight. The requirements for standard equipment and oil tank load are varied slightly from country to country.
[2] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E00) equivalent

Figure 2. Vehicle weight-based passenger car vehicle GHG or efficiency standards, fleet-average vehicle curb mass across regions, and comparison of standard slope

CREDITS AND FLEXIBILITIES

The proposed Phase 4 standard provides three types of credits: for new-energy vehicles (battery-electric, fuel cell and plug-in hybrids); for other ultra-low fuel consumption vehicles, i.e., those with fuel consumption less than or equal to 2.8L/100km on the combined urban and extra-urban cycle; and for vehicles equipped with innovative technologies leading to real-world fuel saving (so-called off-cycle technology credits). The standard will phase in gradually.

New energy vehicles are counted as multiple vehicles towards manufacturers' CAFC calculation for compliance. The multiplier is set at 5 in 2016–2017, falling to 3 in 2018–2019, and then to 2 in 2020. For the CAFC calculation, the energy consumption of battery-electric vehicles, the electric-drive part of plug-in hybrid vehicles and fuel cell vehicles are counted as zero. An alternative possible accounting for pure electric and the

electric portion of PHEVs would be to use converted gasoline-equivalent fuel economy with an equation developed from a separate regulatory proposal (Fuel Economy Evaluation Method for Electric-drive Vehicles, January 2013). This would be further clarified in the Corporate-Average Fuel Consumption Accounting Method for Phase 4 standard to be released later.

Other ultra-low fuel consumption vehicles with combined fuel consumption no more than 2.8L/100km will be counted as 3 vehicles in 2016–2017, 2.5 in 2018–2019, and 1.5 in 2020.

Off-cycle technology credits. The proposed Phase 4 standard offers compliance credits to manufacturers that install innovative technologies with justifiable real-world fuel saving on their vehicles. Currently the regulatory agency is considering four types of technologies eligible for the credits: tire pressure monitoring system; high-efficiency air-conditioning system; start-stop system; and transmission gear shift reminder. Manufacturers that install one or more of these technologies with demonstrated fuel-saving are eligible for up to 0.5 L/100km credit towards their CAFC standard compliance. The details of the off-cycle fuel-saving technology credits will be specified separately and issued at a later date.

Phase in. The proposed Phase 4 standard will phase in gradually, beginning in 2016. Manufacturers are allowed to exceed their required 2020 CAFC targets by a certain percentage between 2016 and 2019. Table 2 details the phase-in schedule.

Table 2. Phase-in schedule of proposed Phase 4 standard

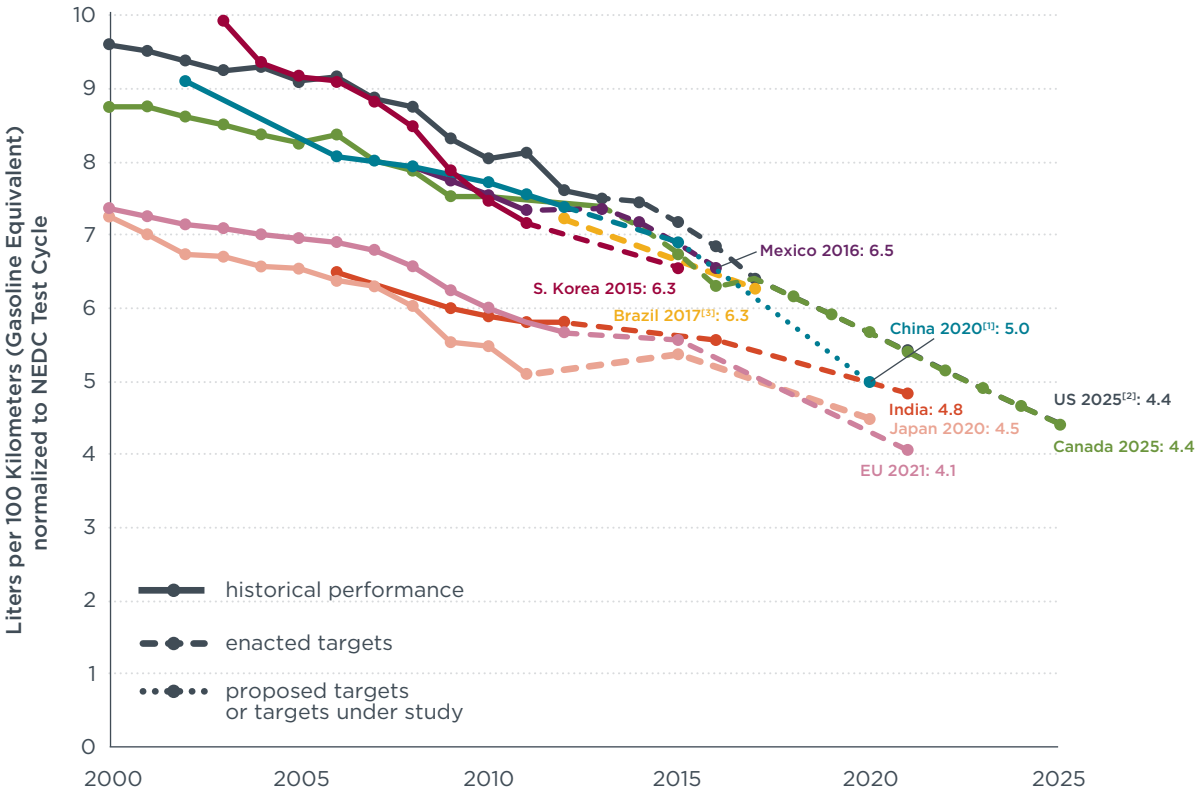
Year	CAFC/CAFC$_T$*
2016	132%
2017	124%
2018	116%
2019	108%
2020 and beyond	100%

* CAFC=Actual corporate-average fuel consumption of a manufacturer in a given year; CAFC$_T$ = Corporate-average fuel consumption target of a manufacturer in 2020

Note that the percentages for the phase-in schedule are larger than the average annual reduction required from 2015 to 2020. If manufacturers are allowed to bank credits during the phase-in period, that in turn could allow them to meet a less stringent standard in 2020. The Phase 4 standard proposal did not specify whether a manufacturer can bank compliance credits and carry over the credits to future years. However, the *Passenger Car Corporate-Average Fuel Consumption Accounting Method* released in March 2013 (to guide the Phase 3 standard CAFC implementation) allows manufacturers to over-comply and carry forward the credits for future compliance for up to three years. It is possible that this rule also applies to the Phase 4 standard implementation.

INTERNATIONAL COMPARISON

As shown in Figures 3 and 4, in absolute terms the proposed Phase 4 standard would put China third, behind the EU and Japan, with respect to passenger car[3] fuel consumption and equivalent GHG emissions requirements during the 2016–2020 period[4]. However, given the great differences in fleet mix, characteristics, and even baseline fuel economy and technology adoption among the various regions, looking only at the absolute fleet targets does not give the full picture of the regulatory stringency of the standards enacted or proposed in these regions. The required annual fleet fuel consumption reduction rates offer an alternative means to evaluate and compare standard stringency across regions. Figure 5 illustrates the required rates of reduction in annual average fleet fuel consumption during the latest regulatory term (or regulatory proposal term) across regions. As the figure shows, China's proposed Phase 4 standard would require approximately 6.2% annual reduction in fuel consumption of new passenger vehicles from 2015 to 2020.

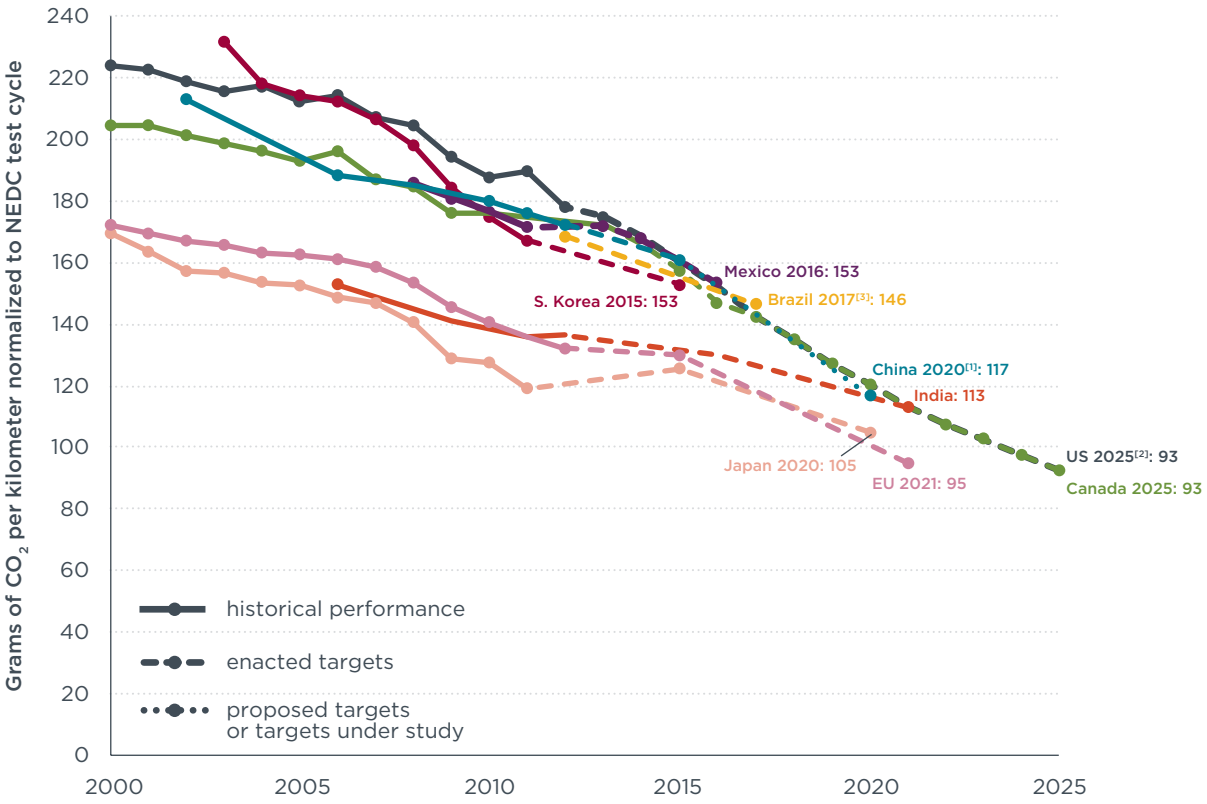


[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.
[2] The U.S. standards are fuel economy standards set by NHTSA, which is slightly different from GHG standards due to A/C credits.
[3] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E00) equivalent
[4] Supporting data can be found at: http://www.theicct.org/info-tools/global-passenger-vehicle-standards.

Figure 3. Comparison of global passenger vehicle fuel consumption standards normalized to NEDC L/100km

3 Note that regulations in the US, Mexico, and Canada set separate standards for new car and light truck fleets, as well as targets for the combined light-duty vehicle fleet. The Chinese Phase 4 standard proposal (like all the previous Chinese standards) only applies to passenger cars, including sedans, SUVs, multipurpose vehicles and cross-style vehicles corresponding to M1 and M1G categories in the European vehicle classification system. In Figures 2 and 3, in order to make apples-to-apples comparison of standards, we only show the car fleet standards in the each region.

4 The minor discrepancy between the U.S. GHG standards and fuel efficiency standards shown in Figure 2 and 3 is due to the exclusion of credits for using A/C refrigerants with lower global warming potential from the fuel efficiency standards.



[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.
[2] US standards GHG standards set by EPA, which is slightly different from fuel economy standards due to low-GWP refrigerant credits.
[3] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E00) equivalent
[4] Supporting data can be found at: http://www.theicct.org/info-tools/global-passenger-vehicle-standards.

Figure 4. Comparison of global passenger vehicle GHG emissions standards normalized to NEDC gCO_2/km

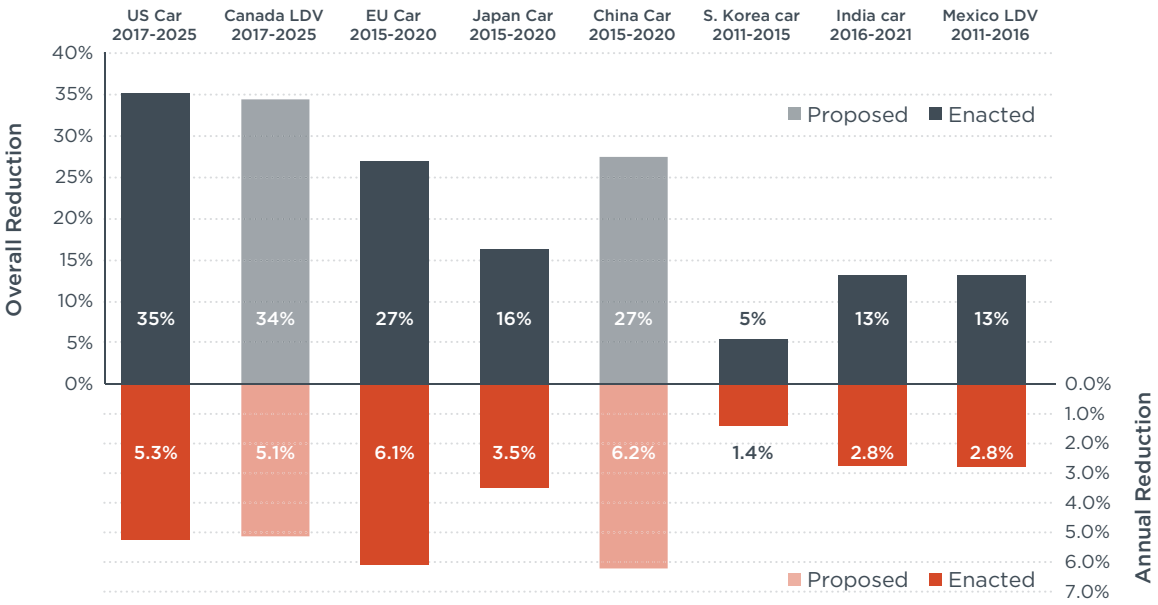


Figure 5. Comparison of overall and annual average fleet fuel consumption reduction rates under proposed or enacted standards across regions

REMAINING ISSUES

The proposed standard does not specify any enforcement mechanism. In fact, the current (Phase 3) standard, the first-ever corporate-average type of standard in China, has been phased in over two years without a solid enforcement plan. In addition, as indicated above, detailed provisions concerning off-cycle fuel-saving technology credits are missing from this proposal, promised at a later date.